No. 2015-1786

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

BODYMEDIA, INC.,

Appellant,

v.

BASIS SCIENCE, INC.,

Appellee.

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in *Inter Partes* Reexamination No. 95/002,371, Appeal No. 2015-000274

BASIS SCIENCE, INC.'S RESPONSIVE BRIEF

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CERTIFICATE OF INTEREST

Counsel for Appellee Basis Science, Inc. certifies the following pursuant to Federal Circuit Rule 47.4:

1. The full name of every party or amicus represented by me is:

   Basis Science, Inc.

2. The name of the real party in interest (if the party named in the caption is not the real party in interest) represented by me is:

   As indicated in item 1.

3. All parent corporations and any publicly held companies that own 10 percent or more of the stock of the party or amicus curiae represented by me are:

   Intel Corporation.

4. The names of all law firms and the partners or associates that appeared for the party or amicus now represented by me in the trial court or agency or are expected to appear in this case are:

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TABLE OF CONTENTS

Page

TABLE OF AUTHORITIES

Page(s)

CASES

STATUTES

ABBREVIATIONS

BodyMedia	Appellant BodyMedia, Inc.
Basis	Appellee Basis Science, Inc.
’437 patent	U.S. patent No. 7,689,437
Amano	U.S. Patent No. 6,030,342
Amano 2	U.S. Patent No. 5,941,837
Mault	U.S. Patent No. 6,478,736
Myllymaki	U.S. Patent No. 5,670,944
ACP	Action Closing Prosecution
RAN	Right of Appeal Notice
PTAB	Patent Trial and Appeal Board
GSR	galvanic skin response
A	Page in Joint Appendix for this appeal
	NOTE: All emphases in this brief have been added unless otherwise noted.

STATEMENT OF RELATED CASES

Counsel for appellee Basis Science, Inc. certifies the following pursuant to Federal Circuit Rule 47.5:

1. No other appeal in or from the same *inter partes* reexamination of U.S. Patent No. 7,689,437 was previously before this Court or any other appellate court.

2. BodyMedia, Inc. filed suit against Basis Science, Inc. for infringement of U.S. Patent No. 7,689,437 in the United States District Court for the District of Delaware, *BodyMedia, Inc. v. Basis Science, Inc.*, No. 1:12-cv-00133-GMS (D. Del.). Pursuant to stipulation, the district court dismissed the action without prejudice.

3. Related U.S. Patent No. 8,073,707 was also the subject of an *inter partes* reexamination involving the parties, which is currently on appeal before this Court in Appeal No. 2015-1788.

JURISDICTIONAL STATEMENT

This is an appeal from the Decision of the United States Patent and Trademark Office, Patent Trial and Appeal Board in an *inter partes* reexamination. The Decision affirmed the Examiner's rejection of claims 32-55 of U.S. Patent No. 7,689,437. A1-A21. This Court has jurisdiction over this appeal pursuant to 28 U.S.C. § 1295(a)(4)(A) and 35 U.S.C. §§ 141(b), 319.

STATEMENT OF ISSUES

1. Whether the PTAB erred in its construction of "calculating, directly from said first and second parameters" in claim 32 of U.S. Patent No. 7,689,437.

2. Whether the PTAB erred in finding claims 32-37, 40-43, 46-51, 53, and 54 of U.S. Patent No. 7,689,437 anticipated by U.S. Patent No. 6,030,342.

3. Whether the PTAB erred in finding that one of ordinary skill in the art would combine the teachings U.S. Patent No. 5,670,944 with U.S. Patent No. 6,030,342 to find claims 39 and 45 obvious.

STATEMENT OF THE CASE

On September 14, 2012, Basis Science, Inc. ("Basis") filed a request for *inter partes* reexamination of claims 1-55 of BodyMedia, Inc.'s ("BodyMedia's") U.S. Patent No. 7,689,437 ("the '437 patent"), based on several patents, including U.S. Patent No. 6,030,342 ("Amano") and U.S. Patent No. 5,670,944 ("Myllymaki"). A54-A153.

On November 29, 2012, the Patent Office granted Basis' request for reexamination (A357-A368) and issued an office action rejecting the claims (A313-A354). On February 28, 2013, BodyMedia submitted a response traversing the rejections. A383-A404.

On September 27, 2013, the Patent Office issued an Action Closing Prosecution ("ACP"), restating its rejection of claims 1-55, including rejection of claims 32-55 based on Amano and Myllymaki. A460; A485. Following BodyMedia's and Basis' Comments, on January 16, 2014, the Patent Office issued a Right of Appeal Notice ("RAN") maintaining the same rejections. A613; A636. On February 18, 2014, BodyMedia appealed to the Patent Trial and Appeal Board ("PTAB"). A667. On March 25, 2015, the PTAB issued its Decision on Appeal, affirming the rejections of claims 1-55. A1-A21. BodyMedia now appeals the PTAB's rejection of claims 32-55.

STATEMENT OF FACTS

I. BODYMEDIA'S '437 PATENT

The '437 patent is directed to a system for detecting, monitoring, and reporting an individual's physiological state. A25 [Abstract]; A40 [1:50-56]. The system includes a sensor device that can be worn on the user's body. A41 [4:28-30]. The sensor device contains one or more sensors that measure various physiological characteristics of the user to generate what the patent refers to as data indicative of physiological parameters—*e.g.*, heart rate, heat flow, body temperature, galvanic skin response ("GSR"), or activity (motion). *Id.* [4:30-52]. Table 1 of the patent sets forth various physiological parameter data and the sensors used to generate them:

TABLE 1

Parameter	Method	Sensor	Signal	Further Processing
Heart Rate	EKG	2 Electrodes	DC Voltage	Yes
Pulse Rate	BVP	LED Emitter and Optical Sensor	Change in Resistance	Yes

TABLE 1-continued

Parameter	Method	Sensor	Signal	Further Processing
Beat-to-Beat Variability	Heart Rate	2 Electrodes	DC Voltage	Yes
EKG	Skin Surface Potentials	3-10 Electrodes	DC Voltage	No
Respiration Rate	Chest Volume Change	Strain Gauge	Change in Resistance	Yes
Skin Temperature	Surface Temperature Probe	Thermistors	Change in Resistance	Yes
Core Temperature	Esophageal or Rectal Probe	Thermistors	Change in Resistance	Yes
Heat Flow	Heat Flux	Thermopile	DC Voltage	Yes
Galvanic Skin Response	Skin Conductance	2 Electrodes	Change in Resistance	No
EMG	Skin Surface Potentials	3 Electrodes	DC Voltage	No
EEG	Skin Surface Potentials	Multiple Electrodes	DC Voltage	Yes
EOG	Eye Movement	Thin Film Piezoelectric Sensors	DC Voltage	Yes
Blood Pressure	Non-Invasive Korotkuff Sounds	Electronic Sphygromarometer	Change in Resistance	Yes
Body Fat	Body Impedance	2 Active Electrodes	Change in Impedance	Yes
Activity in Interpreted G Shocks per Minute	Body Movement	Accelerometer	DC Voltage, Capacitance Changes	Yes
Oxygen Consumption	Oxygen Uptake	Electro-chemical	DC Voltage Change	Yes
Glucose Level	Non-Invasive	Electro-chemical	DC Voltage Change	Yes
Body Position (e.g. supine, erect, sitting)	N/A	Mercury Switch Array	DC Voltage Change	Yes
Muscle Pressure	N/A	Thin Film Piezoelectric Sensors	DC Voltage Change	Yes
UV Radiation Absorption	N/A	UV Sensitive Photo Cells	DC Voltage Change	Yes

A41-A42 [Table 1]; A42 [5:38-40].

The ’437 patent explains that using known methods, the sensor device can use the physiological parameter data to derive additional information relating to a user’s physiological condition—information such as calorie expenditure, ovulation, and stress level. A42 [6:38-46]. Table 2 of the patent provides examples of types

of derived information:

TABLE 2

Derived Information	Data Used
Ovulation	Skin temperature, core temperature, oxygen consumption
Sleep onset/wake	Beat-to-beat variability, heart rate, pulse rate, respiration rate, skin temperature, core temperature, heat flow, galvanic skin response, EMG, EEG, EOG, blood pressure, oxygen consumption
Calories burned	Heart rate, pulse rate, respiration rate, heat flow, activity, oxygen consumption
Basal metabolic rate	Heart rate, pulse rate, respiration rate, heat flow, activity, oxygen consumption
Basal temperature	Skin temperature, core temperature
Activity level	Heart rate, pulse rate, respiration rate, heat flow, activity, oxygen consumption
Stress level	EKG, beat-to-beat variability, heart rate, pulse rate, respiration rate, skin temperature, heat flow, galvanic skin response, EMG, EEG, blood pressure, activity, oxygen consumption

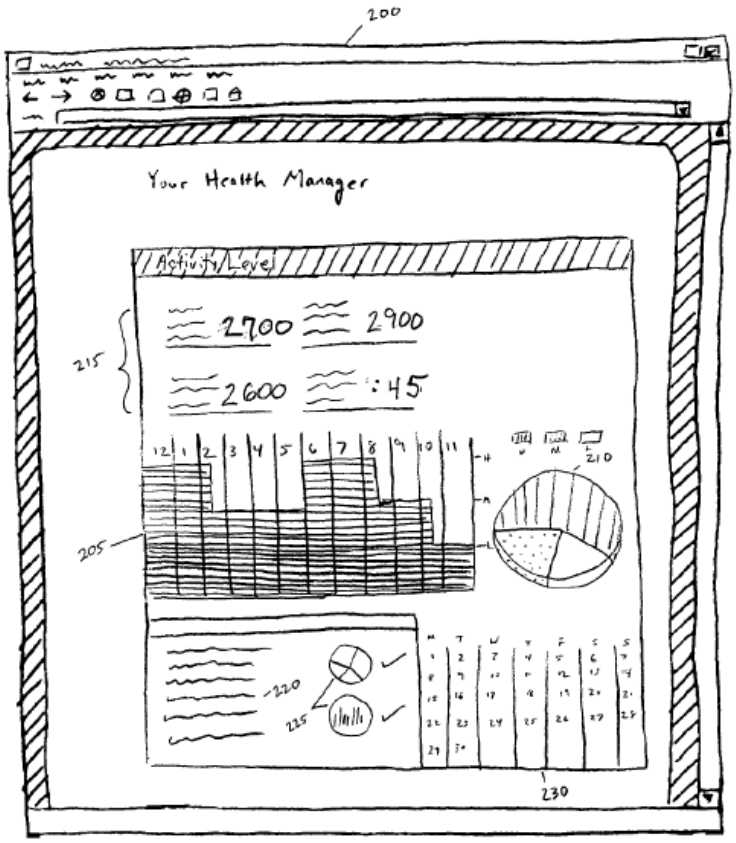
TABLE 2-continued

Derived Information	Data Used
Relaxation level	EKG, beat-to-beat variability, heart rate, pulse rate, respiration rate, skin temperature, heat flow, galvanic skin response, EMG, EEG, blood pressure, activity, oxygen consumption
Maximum oxygen consumption rate	EKG, heart rate, pulse rate, respiration rate, heat flow, blood pressure, activity, oxygen consumption
Rise time or the time it takes to rise from a resting rate to 85% of a target maximum	Heart rate, pulse rate, heat flow, oxygen consumption
Time in zone or the time heart rate was above 85% of a target maximum	Heart rate, pulse rate, heat flow, oxygen consumption
Recovery time or the time it takes heart rate to return to a resting rate after heart rate was above 85% of a target maximum	Heart rate, pulse rate, heat flow, oxygen consumption

A42-A43 [Table 2]; A42 [6:47-49]. The table also identifies the data indicative of physiological parameters that are used to generate the derived data. For example, Table 2 shows that calories burned can be generated from heart rate, pulse rate, respiration rate, heat flow, activity, and oxygen consumption. A42-A43 [Table 2]; *see also* A47 [16:29-34] (explaining that calories burned can be calculated in a variety of manners, including by multiplying either sensed motion or heat flux by time).

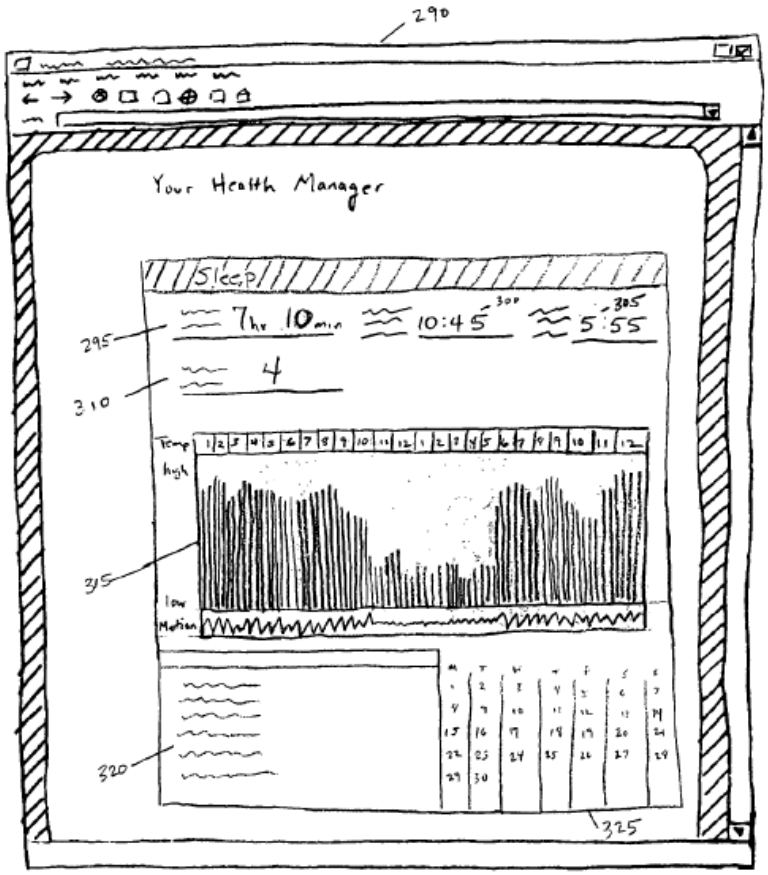
The ’437 patent system then presents the data to the user in visual, acoustic (*e.g.*, audible alerts), or tactile form (*e.g.*, vibrations). A44 [10:20-25]. Visual

presentation includes display using a screen on the sensor device or through web pages generated by the central monitoring unit. *Id.* [10:21-22]; A46-A49 [14:31-20:51]. For example, a web page relating to a user's activity presents the user with target calories, number of calories burned, duration of activity, as well as a graph (205) showing the user's activity over time:



A35; A47-A48 [16:50-17:8].

Similarly, a web page with sleep data shows the duration of a user's sleep (295) and a graph (315) plotting measured heat flow and motion over time:



A37; *see also* A48 [18:18-38].

II. *INTER PARTES* REEXAMINATION PROCEEDINGS

On September 14, 2012, Basis filed a request for *inter partes* reexamination of the ’437 patent. The Patent Office granted the request and ultimately rejected claims 1-55 of the ’437 patent. Specifically, claims 32-37, 40-43, 46-51, 53, and 54 were rejected as anticipated by Amano. Claims 39 and 45 were rejected as obvious over Amano in view of Myllymaki.

A. Rejection of Claims 32-55 Based on Anticipation by Amano

1. Amano

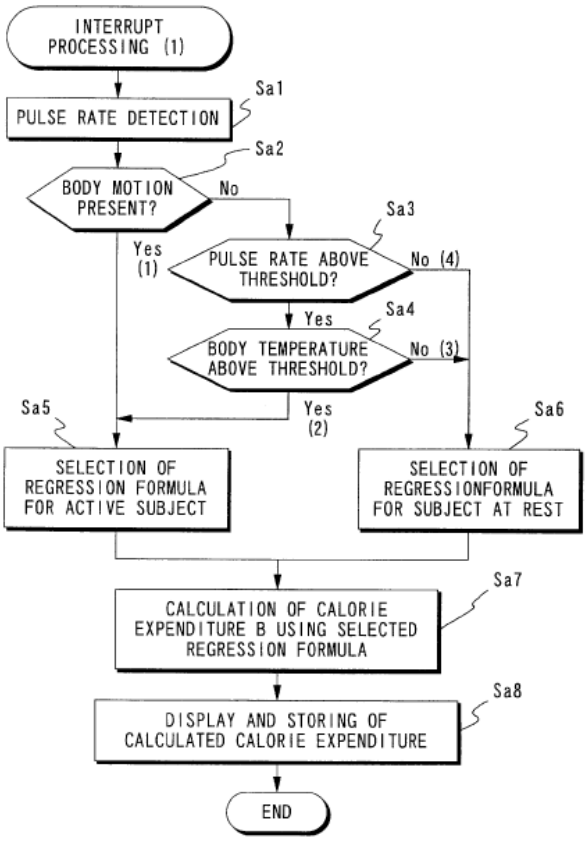
Like the ’437 patent, Amano discloses a system for detecting, monitoring,

and reporting a user's physiological state. The system includes a device worn on a user's body. A251 [1:7-19]. The device includes multiple sensors that detect various physiological characteristics. The sensors include a body motion sensor, pulse rate detector, and body temperature detector. A253-A254 [6:57-7:37]; A255 [9:35-44]. Amano explains that use of various sensors helps to discriminate between elevated pulse rate due to exercise and elevated pulse rate due to other factors such as stress. A251 [1:55-62].

The device in Amano uses the measured parameters to derive additional information. For example, Amano describes using body temperature and motion to determine a user's basal metabolic state. A256 [11:19-12:7]; A258-A259 [16:56-18:5]. Using motion, pulse rate, and body temperature, the device can also calculate a user's caloric expenditure. A231; A259 [18:6-50].

Specifically, using multiple sensors, the device in Amano can discriminate between resting and active states to calculate calorie expenditure with high accuracy. A251 [2:9-16]. It does this by using pulse rate, body temperature, and motion to select a suitable regression formula based on the user's activity level to calculate caloric expenditure from pulse rate. A259 [18:6-45]. This process for calculating caloric expenditure is shown in Figure 17:

FIG. 17



A231. In step Sa1, the device determines the user's pulse rate. A259 [18:13-15]. In step Sa2, using a body motion sensor, the device determines if the user is moving. *Id.* [18:16-20]. If so, the device determines the user is in an active state and selects the "active" regression formula at step Sa5. *Id.* [18:29-34].

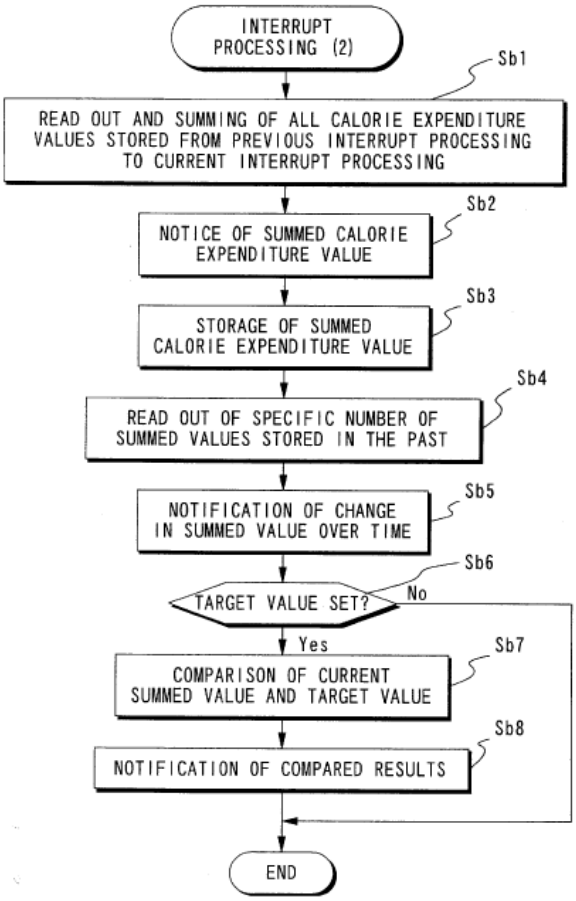
If at step Sa2, the body motion sensor does not sense movement, the device will move on to step Sa3 and determine whether the pulse rate measured at step Sa1 is above a certain threshold, indicating that the user may not be at rest. *Id.* [18:21-23]. If the pulse rate does not exceed the threshold, at step Sa6, the user is assumed to be at rest and a "resting" regression formula is selected.

If the pulse rate exceeds the threshold, at step Sa4, the device checks whether body temperature exceeds a certain threshold. *Id.* [18:24-25]. If not, then the user is assumed to be at rest and the "resting" regressing formula is used. *Id.* [18:34-38]. But if the body temperature exceeds the threshold, then the user is determined to be in an active state and an active regression formula is selected at Sa5. *Id.* [18:29-33].

Once the appropriate regression formula is selected, at step Sa7, the device in Amano will use the previously measured pulse rate to calculate caloric expenditure. *Id.* [18:39-43]. The result is then presented on display 205. *Id.* [18:43-45].

Amano can also provide users with an assessment of how well they are meeting a calorie expenditure target. Amano explains that a target value for calorie expenditure can be set by the subject or a third party such as a physician. A260 [19:34-39]. The Amano device can then compare a user's measured calorie expenditure to the target value:

FIG. 18



A232; *see also* A260 [19:1-51]. Amano provides feedback in the form of an achievement rate: CPU 201 compares the summed value from step Sb1 and the target value, and calculates the achievement rate G with respect to the target value from the following formula:

$$\text{Achievement rate } G=(\text{summed value}/\text{target value})\times 100$$

A260 [19:44-49]. The achievement rate can also be provided in the form of a bar graph or pie chart showing a user's progress toward a target:

FIG. 20

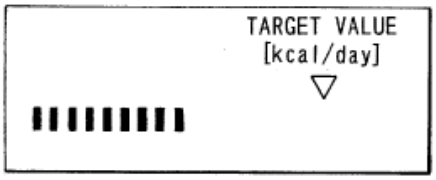
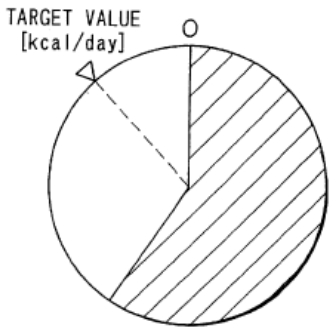


FIG. 21



A233 [Figs. 20, 21]. Alternatively, Amano discloses using a face chart that indicates a user's level of achievement:

ACHIEVEMENT RATE G	FACE CHART
G < 70	
70 ≦ G < 80	
80 ≦ G < 90	
90 ≦ G < 100	
100 ≦ G < 110	
110 ≦ G	

A234.

2. Reexamination Proceedings

The Examiner in the *inter partes* reexamination rejected claims 32-37, 40-43, 46-51, 53, and 54 of the '437 patent as anticipated by Amano. A613.

Specifically, each of the claims includes the following limitation of claim 32:

> . . . *calculating,* ***directly from said first and second parameters***, *quantitative status information* indicative of the relative degree of achievement of said individual's performance to assist said individual in achievement of said physiological status goal . . . .

A51 [24:37-40]. The Examiner found that Amano disclosed this limitation because it calculates a caloric expenditure achievement rate (quantitative status information) directly from first and second parameters (pulse rate and body temperature). A322; A464.

During the reexamination, BodyMedia disputed the Examiner's finding, arguing that the caloric expenditure achievement rate in Amano was not calculated ***directly*** from pulse rate and body temperature. A385. Specifically, BodyMedia advocated a narrow construction of ***directly*** and argued that Amano used a multi-step ***indirect*** calculation whereby (1) pulse rate and body temperature were first used to select a regression formula, (2) the regression formula was used with pulse rate to generate caloric expenditure, and (3) caloric expenditure was then used to determine an achievement rate. A387-A388; A526-A531.

The Examiner maintained the rejections and noted that BodyMedia's narrow construction of "directly" was contrary to the '437 patent specification, file history, and claim language. A496-A500; A646-A654. The Examiner, instead, adopted

the plain and ordinary meaning of "directly" as "from point to point without deviation: by the shortest way." A654. Applying this construction, the Examiner maintained the rejections based on Amano.

On appeal to the PTAB, BodyMedia argued that to give proper meaning to "directly," the phrase "calculating, directly from said first and second parameters" requires "executing a mathematical process or formula having the two parameters as inputs." A823. Using that construction, BodyMedia reiterated its position that Amano's calculation is a multi-step process, requiring selection of a regression formula, and then calculation of caloric expenditure using pulse data. A821-A822.

The PTAB rejected BodyMedia's claim construction argument, finding the '437 patent specification did not offer any limiting description of the term "calculating, directly." A6. It, therefore, adopted the Examiner's construction of "from point to point without deviation: by the shortest way" as a broad, but reasonable construction. *Id*. Applying that construction, the PTAB affirmed the Examiner's finding that, by calculating caloric expenditure from pulse rate and body temperature, and achievement rate from caloric expenditure, Amano disclosed calculating achievement rate in a direct manner, proceeding directly from pulse rate and body temperature. *Id*.

B. Rejection of Claims 39 and 45 Based on Amano and Myllymaki

1. Myllymaki

Claims 39 and 45 of the '437 patent further require the use of data from a

GSR sensor to calculate caloric expenditure. A52 [25:25-31, 26:4-10]. Because Amano does not disclose use of a GSR sensor, the Examiner relied on the combination of Amano and Myllymaki to reject claims 39 and 45.

Myllymaki is directed to a wearable monitoring device that uses both motoric activity and physical changes in the skin to provide feedback regarding a user's physical condition. A273 [1:5-9, 1:28-33]. The Myllymaki device includes a body monitor worn around a user's chest or ankle, for example, and a wrist-held display and detection unit. *Id.* [1:6-55]. The body monitor, and optionally the wrist unit, includes various sensors that detect physiological data, including a heart rate detector, an acceleration sensor, a temperature sensor, and a skin conductivity sensor (GSR sensor). *Id.* [1:6-9, 2:45-52]. The device processes the data from the various sensors, taking into account the interrelations and combined effect of the indicators from the various sensors to produce a substantially more reliable description of a user's condition. A274 [3:3-17]. The combined outputs from multiple sensors including GSR allows the device to distinguish between a high heart rate caused by exercise versus high heart rate due to illness or stress, for example. *Id.* [3:17-31]. The device provides feedback regarding the user's condition through an indicator or alarm on the wrist unit. A273 [1:60-67, 2:3-31].

2. Reexamination Proceedings

In the reexamination, the Examiner found it would have been obvious to

combine the use of GSR sensors in Myllymaki with the teachings of Amano. A485-A486. BodyMedia argued that there is no motivation for using the GSR sensor in Myllymaki with Amano because neither reference discloses using GSR to calculate caloric expenditure. A533-A534; A825-A829; A892-A893.

The Examiner, however, noted that both Amano and Myllymaki disclose devices with multiple sensors for reporting a user's physiological condition. A655-A657. Both references also recognized that use of multiple sensors provides more accurate and reliable health condition information to the user. *Id.* Both references explain that pulse rate alone may not provide an accurate indication of activity, and thus additional sensors can be used to distinguish between increased heart rate due to activity or other factors like stress or illness. *Id*. Based on these teachings, the Examiner found that it would have been obvious to add the GSR sensor of Myllymaki to improve the device in Amano. A657. In its Decision, the PTAB agreed, explicitly adopted the Examiner's reasoning, and affirmed the rejection. A9.

SUMMARY OF ARGUMENT

In finding claims 32-37, 40-43, 46-51, 53, and 54 of the '437 patent anticipated by Amano, the PTAB applied the proper construction of "calculating, directly from said first and second parameters." The PTAB correctly construed the term to mean "calculating from point to point without deviation: by the shortest way." A6. BodyMedia contends that this is an impermissibly broad construction. Opening Br. at 17-21. It argues that to give meaning to the word "directly," the term should be construed to require executing a mathematical process or formula having the two parameters as inputs. *Id*. But in reexaminations, unless the patent specification provides a narrowing definition, claims are to be given their broadest reasonable construction. *See In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1379 (Fed. Cir. 2007).

There is nothing in the '437 patent specification that limits "calculating, directly" to any specific mathematical process or formula. The specification does not disclose how to calculate caloric expenditure or any derived or physiological status. A653-A654. In fact, it does not include any mathematical formula. And nowhere does it describe or disclose "a mathematical process or formula having two parameters as input." The specification notes that different parameters and physiological status data are generated and calculated, but it provides no explanation as to how those calculations are done.

Therefore, the PTAB correctly found that Amano discloses calculating a caloric expenditure achievement rate directly from pulse rate and body temperature. Body temperature and pulse rate are used to select a regression formula in which pulse rate is entered to generate caloric expenditure. A231; A259 [18:21-46]. Caloric expenditure is then compared to a preset goal to determine an achievement rating. A260 [19:34-49]. Thus, directly from body temperature and pulse rate, the device in Amano calculates the user's caloric expenditure achievement rate.

BodyMedia also argues that the PTAB erred in rejecting claims 39 and 45 as obvious over Amano in view of Myllymaki. Specifically, BodyMedia claims there is no motivation to combine the use of the GSR sensor disclosed in Myllymaki with the device in Amano because neither reference discloses using a GSR sensor for calculating caloric expenditure. But both Amano and Myllymaki are directed to devices worn on the body that use motion, heart rate, and body temperature sensors. Both Amano and Myllymaki explain that use of multiple sensors can improve reliability of the generated data. In particular, both Amano and Myllymaki explain that additional sensors are useful in determining whether a high heart rate is the result of physical activity or other factors such as stress or illness. A274 [3:17-31]; A253 [5:52-59]. Thus, there is substantial evidence supporting the PTAB's finding that it would have been obvious to add a GSR sensor from

Myllymaki to Amano to more accurately determine a user's activity level.

Accordingly, this Court should affirm the PTAB's rejections of claims 32-55 of the '437 patent.

ARGUMENT

I. STANDARD OF REVIEW

Claim construction is a question of law. *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 384 (1996); *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1454-56 (Fed. Cir. 1998) (en banc). This Court reviews legal issues *de novo*. *In re Eisner*, 381 F.3d 1125, 1127 (Fed. Cir. 2004). This Court reviews the PTAB's factual determinations for substantial evidence. *In re Gartside*, 203 F.3d 1305, 1315 (Fed. Cir. 2000).

Whether a claim is obvious is a question of law based on underlying findings of fact. *Id.* at 1316. "The presence or absence of a motivation to combine references in an obviousness determination is a pure question of fact" and should thus be reviewed for substantial evidence. *Id*.

II. THE PTAB PROPERLY REJECTED CLAIMS AS ANTICIPATED BY AMANO

Claims 32-37, 40-43, 46-51, 53, and 54 of the '437 patent all require "calculating [quantitative status information], directly from said first and second parameters." The PTAB construed "calculating, directly" as "calculating point to point without deviation: by the shortest way." Applying this construction, the PTAB correctly found that Amano discloses the "calculating, directly" limitation, and that claims 32-37, 40-43, 46-51, 53, and 54 were anticipated by Amano.

A. The PTAB Was Correct in Finding Amano Discloses "Calculating, Directly"

1. The PTAB Correctly Construed "Calculating, Directly"

In reexaminations, claims are to be given their broadest reasonable construction. *In re ICON Health*, 496 F.3d at 1379. Absent some special definition provided in the specification, terms should be broadly construed. *Id*. That is what the PTAB did in construing "calculating, directly from said first and second parameters" in accordance with its plain and ordinary meaning. A6 (citing A21); *see* A654.

BodyMedia, however, contends that the PTAB's construction is "impermissibly broad." Opening Br. at 16-17. It argues that "calculating, directly from said first and second parameters" should be construed narrowly to require executing a mathematical process or formula having the two parameters as inputs. *Id.* at 19. Using this narrow definition, BodyMedia attempts to limit "calculating, directly from said first and second parameters" to single-step processes. *Id*. at 21 (arguing that the PTAB's construction improperly encompasses calculations with multiple steps).

But BodyMedia provides no support from the '437 patent specification to support this narrow construction. *Id.* at 19-22. The specification does not set forth any formula or description as to how to calculate quantitative status information or any other derived information. The patent simply states that the system generates

data and derives additional information based on "known methods." *See, e.g.*, A41 [4:46-53] (stating that methods for generating data are well known); A42 [5:43-6:44] (stating that a microprocessor can derive information relating to physiological state based on physiological parameters using known methods). The specification does not provide any suggestion as to what the "known methods" are or how to perform any calculations. A41 [4:46-53]; A42 [5:43-6:44].

In describing the types of information that can be presented to the user, the specification explains that information can be calculated from sensor data, but does not disclose any process, formula, or algorithm. In the Mind Centering example, the '437 patent explains that status or achievement levels can be calculated using the various sensor data (A48 [17:27-33]), but offers no formula for doing so. Similarly, in the Sleep example, the patent states that sleep duration and other sleep parameters are calculated (*Id.* [18:26-38]), but again fails to disclose the formula or method for performing the calculation. In connection with calculating calories burned, the specification states:

> Calories burned may be calculated in a variety of manners, including: the multiplication of the type of exercise input by the user by the duration of the exercise input by the user; sensed motion multiplied by time of motion multiplied by a filter constant; or sensed heat flux multiplied by time multiplied by a filter constant.

A47 [16:29-34]. This is the closest thing to a mathematical formula that the specification provides, and none of the examples contains a formula with two

measured parameters as inputs. Thus, there is nothing in the '437 patent specification that supports BodyMedia's construction of "executing a mathematical process or formula with the two parameters as inputs."

BodyMedia argues that the PTAB's construction fails to give meaning to the word "directly." The file history, however, shows that the addition of the word "directly" was not intended to restrict the formulas or algorithms that could be used in the calculation. The word "directly" was added by an amendment dated February 16, 2006. A2449-A2450. After the amendment was added, the applicants explained that the limitation was supported by the part of the specification that describes calculating relaxation status using various sensed parameters such as skin temperature, heart rate, heat flow, or respiration rate. A2020 (identifying page 29, lines 5-11, which corresponds to A48 [17:23-33]). That description does not explain how the data are used to calculate status, and provides no indication that "directly" was intended to restrict how many steps or the type of formula that could be used in the calculation. *Id*. Indeed, the applicants explained, "[t]he essence of the above limitation is a calculating step wherein the inputs are the first parameter and the second parameter." A1765. Thus, the file history makes clear the "calculating, directly" limitation is about using two parameters, but otherwise there is no indication as to how the two parameters are used.

The claim language itself establishes that "calculating, directly" can be a multi-step process. Claim 51, for example, depends from claim 32 and includes the "calculating, directly" limitation. It further requires that the first and second parameters be used to generate derived data, and that the derived data then be used to calculate the physiological status goal. A52 [26:53-59]. Thus, the construction of "calculating, directly" in claim 32 must be broad enough to encompass claim 51's multi-step calculation of (1) calculating derived data from first and second parameters, and (2) using the derived data to calculate the physiological status goal.

2. Applying the Correct Construction, Amano Discloses "Calculating, Directly"

Like claim 51, Amano describes generating derived data (caloric expenditure) directly from first and second measured parameters (pulse rate and body temperature) and then calculating an achievement rating from the derived caloric expenditure.

At the first point, Amano determines a user's pulse rate. A259 [18:13-15]. Amano then uses a body motion sensor to determine whether the user is moving. *Id.* [18:16-20]. If the body motion sensor does not sense movement, Amano determines whether the measured pulse rate is above a certain threshold, which may indicate the user is active despite lack of movement. *Id.* [18:21-23].

Amano explains that calculations using only heart rate are inaccurate because they cannot account for other reasons heart rate might be depressed or elevated. A251 [1:55-62]. Therefore, if the pulse rate exceeds the threshold, to improve the caloric expenditure calculation, the Amano device then checks body temperature. A259 [18:24-25]. If body temperature exceeds a certain threshold, it then suggests the user may be in some active state and Amano selects an "active" regression formula. A251 [1:29-33]. At the final point, the measured pulse rate is input into the selected regression formula to calculate caloric expenditure. A259 [18:39-45].

The measured caloric expenditure can thereafter be compared to a target value to provide the user with an assessment of performance, using the following formula:

Achievement rate G=(target value−TEMP/target value)×100

A261 [21:5-10]. Thus, both heart rate and body temperature are used in the process to determine caloric expenditure and ultimately, an achievement rating.

BodyMedia argues that using body temperature to select a regression formula is not, however, ***directly*** calculating anything using body temperature. Opening Br. at 19, 21. BodyMedia contends that during prosecution, the Patent Office found that similar disclosures in a different patent, U.S. Patent No. 5,941,837 ("Amano 2"), did not constitute "calculating, directly." BodyMedia

mischaracterizes the prior art and the file history. As a preliminary matter, BodyMedia relies on prosecution statements relating to Amano 2 made in June 2005. *Id.* at 10; A3574-A3578. The "directly" limitation was not added to the claims until February 2006. A2449-A2450. Thus, the prosecution statements do not have any relation to or bearing on the interpretation of "directly," as the term was not even part of the claims at the time.

Additionally, BodyMedia mischaracterizes the art. Amano 2 is a different patent describing a different technology with different disclosures than Amano. Amano 2 is directed to a device for measuring conditions in a patient based on blood circulation state and body movement. A4176 [5:55-60]. The device in Amano 2 uses pulse waveforms to show the state of circulation, but only uses waveforms measured when there is little body movement. *Id.* [6:9-17]. Thus, body movement is used only to disregard certain waveform data, and the applicants explained the only parameter used in determining circulation state in Amano 2 is pulse waveform. A3577. These statements have nothing to do with the disclosures in Amano, which describes a different device, using different sensors, and a different calculation. The disclosures in Amano are not analogous. Amano does not simply use body temperature to disregard data; it is used as part of the caloric expenditure calculation.

BodyMedia also argues that the process disclosed in Amano falls outside even the PTAB's construction of "calculating, directly" because while there may be multiple steps, they must be made without deviation. Opening Br. at 29-30. But there is no deviation in Amano. Every step of the process is taken for the specific purpose of going from pulse rate and body temperature data to caloric expenditure. There is no determination made that is not somehow used as part of the caloric expenditure calculation. Therefore, contrary to BodyMedia's assertion, there is no "deviation" in Amano's calculation.

B. Even Under BodyMedia's Construction, Amano Discloses "Calculating, Directly"

Indeed, even under BodyMedia's narrow construction, Amano discloses "calculating, directly from said first and second parameters, quantitative status information." Amano executes a mathematical process using heart rate and body temperature as inputs to calculate status information. The process begins by checking for motion and then comparing measured heart rate and body temperature against certain thresholds to select a regression formula. Then, the process ends by using the regression formula to calculate caloric expenditure.

As the Examiner recognized, the process for these steps can be written as a single multi-variable mathematical formula:

[1] A simpler version of the previously provided equation is: $\overline{CE} = \frac{1}{\sum_t} \sum_t CE_t$ wherein $CE_t = f_A(P_t, \beta_A) \cdot \{\Theta(v_t) + [1 - \Theta(v_t)] \cdot \Theta(\Delta P) \cdot \Theta(\Delta T)\} + f_R(P_t, \beta_R) \cdot [1 - \Theta(v_t)] \cdot \{1 + \Theta(\Delta P) \cdot \Theta(\Delta T)\}$ wherein $\Delta P := P_t - P_0$, $\Delta T := T_t - T_0$, f_R: resting regression formula, β_R: resting correlation coefficient(s) f_A: active regression formula, β_A: active correlation coefficient(s), P_t: pulse rate at time t, P_0: threshold pulse rate, T_t: body temperature at time t, T_0: threshold body temperature, v_t: speed of body (body motion) at time t, CE_t: calorie expenditure at time t, $\overline{CE}$: time − averaged calorie expenditure, Θ: heaviside step function, where $\Theta := \begin{cases} 1 \text{ if } x > 0 \\ 0 \text{ if } x \leq 0 \end{cases}$.

A498-A499; A598-A599; A649. Accordingly, Amano executes this mathematical formula with body temperature and pulse rate as inputs.

III. THE PTAB PROPERLY REJECTED CLAIMS 39 AND 45 AS OBVIOUS OVER AMANO AND MYLLYMAKI

BodyMedia also challenges the PTAB's rejection of claims 39 and 45 as obvious over Amano in view of Myllymaki. Specifically, BodyMedia contends that the PTAB erred in finding that one of ordinary skill in the art would combine the use of GSR sensors in Myllymaki with the caloric expenditure device of Amano. Opening Br. at 36-45.

The record, however, is replete with evidence supporting the finding that one of ordinary skill in the art would be motivated to combine Myllymaki with Amano. First, both references are directed to portable devices worn by a user for monitoring the user's physiological state. Amano describes a device that can be worn on a user's wrist, which includes multiple sensors for detecting motion, pulse rate, and body temperature. A253-A254 [6:57-7:37]; A255 [9:35-44]. Myllymaki similarly discloses a device that can be strapped to a user's arm or chest, which includes multiple sensors for detecting motion, heart rate, body temperature, and

skin conductivity. A273 [1:60-63].

Second, both references include the specific teaching that the user's physiological condition can be more accurately determined by using data from multiple sensors. One of Amano's stated goals was to more accurately calculate a user's calorie expenditure by using additional sensors to determine whether an elevated pulse rate was due to causes other than physical activity, such as stress or illness. A251 [1:55-62]; *see also id.* [2:46-50]. Myllymaki similarly explains that data from multiple sensors enables a device to detect "whether a higher heart rate results from motoric activity or *e.g.* from a sudden attack of illness with no motoric activity observed." A274 [3:17-22].

Thus, the Examiner relied explicitly on these teachings to combine Amano and Myllymaki. The Examiner noted that Amano disclosed that to determine calorie expenditure more accurately, it is necessary to take into consideration factors other than pulse rate such as a subject's resting or active state. A652 (citing A251 [2:46-50]); *see also* A485-A486; A498; A638-A639; A651. The Examiner also noted Myllymaki's specific disclosure of a GSR sensor to provide more reliable feedback regarding a user's condition. A663; *see also* A274 [3:27-31].

BodyMedia counters that there is no specific teaching in either Amano or Myllymaki of using GSR to calculate caloric expenditure. Opening Br. at 37-38. But the '437 patent specification itself lacks any disclosure of using GSR to

determine caloric expenditure. While it discloses a GSR sensor, Table 2 in the specification does not identify GSR as data that can be used to calculate caloric expenditure:

TABLE 2

Derived Information	Data Used
Ovulation	Skin temperature, core temperature, oxygen consumption
Sleep onset/wake	Beat-to-beat variability, heart rate, pulse rate, respiration rate, skin temperature, core temperature, heat flow, galvanic skin response, EMG, EEG, EOG, blood pressure, oxygen consumption
Calories burned	Heart rate, pulse rate, respiration rate, heat flow, activity, oxygen consumption
Basal metabolic rate	Heart rate, pulse rate, respiration rate, heat flow, activity, oxygen consumption
Basal temperature	Skin temperature, core temperature
Activity level	Heart rate, pulse rate, respiration rate, heat flow, activity, oxygen consumption
Stress level	EKG, beat-to-beat variability, heart rate, pulse rate, respiration rate, skin temperature, heat flow, galvanic skin response, EMG, EEG, blood pressure, activity, oxygen consumption

TABLE 2-continued

Derived Information	Data Used
Relaxation level	EKG, beat-to-beat variability, heart rate, pulse rate, respiration rate, skin temperature, heat flow, galvanic skin response, EMG, EEG, blood pressure, activity, oxygen consumption
Maximum oxygen consumption rate	EKG, heart rate, pulse rate, respiration rate, heat flow, blood pressure, activity, oxygen consumption
Rise time or the time it takes to rise from a resting rate to 85% of a target maximum	Heart rate, pulse rate, heat flow, oxygen consumption
Time in zone or the time heart rate was above 85% of a target maximum	Heart rate, pulse rate, heat flow, oxygen consumption
Recovery time or the time it takes heart rate to return to a resting rate after heart rate was above 85% of a target maximum	Heart rate, pulse rate, heat flow, oxygen consumption

A42-A43. The ’437 patent specification contains no explanation of how to calculate caloric expenditure other than to say it can be calculated “in a variety of manners,” and provides no disclosure at all of using GSR data in any manner in such a calculation. A47 [16:29-30]. Thus, the patent claims would not be enabled if, absent explicit teachings, one of ordinary skill would not know how to use GSR data in a calculation of caloric expenditure.

As the Examiner explained, such explicit teachings are not necessary. "[T]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art." A662 (citing *In re Keller*, 642 F.2d 413, 425 (C.C.P.A. 1981)).

Here, Myllymaki and Amano do not need to establish that the skin conductivity sensor of Myllymaki can be physically incorporated into the structure of Amano. It is enough that the combined teachings would have suggested that use of multiple sensors, including skin conductivity sensors, could be used to generate caloric expenditure, as was done with other sensors in Amano. Amano explains that reliance on pulse rate alone leads to incorrect calculations of caloric expenditure because it fails to account for other reasons for elevated heart rate. A251 [1:55-62]. Therefore, in calculating caloric expenditure, Amano discloses using sensors, such as body motion and body temperature, in addition to pulse rate to determine whether a user is in an active or rest state. A259 [18:16-28]. That determination then affects the regression formula used to calculate caloric expenditure. *Id.* [18:39-45]. The GSR sensors disclosed in Myllymaki also provide information as to whether a user is active or resting (skin perspiration) and

can similarly be used to inform the caloric expenditure calculation. A874. Accordingly, there was substantial evidence to support the PTAB's finding that one of ordinary skill would have been motivated to combine Myllymaki with Amano.

IV. CONCLUSION

For the foregoing reasons, Basis respectfully requests this Court affirm the PTAB's rejection of claims 32-55 of the '437 patent.

Dated: December 14, 2015

Respectfully submitted,

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CERTIFICATE OF SERVICE

I, Carolyn Chang, hereby certify that on December 14, 2015, I caused the foregoing **RESPONSE BRIEF FOR APPELLEE BASIS SCIENCE, INC.** to be served on the following parties as indicated below:

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1. This brief of Appellee complies with the type-volume limitation of Federal Rule of Appellate Procedure 32(a)(7)(B). The brief contains 5,205 words, excluding the parts of the brief exempted by Federal Rule of Appellate Procedure 32(a)(7)(B)(iii) and Federal Circuit Rule 32(b).

2. The brief complies with the typeface requirements of Federal Rule of Appellate Procedure 32(a)(5) and the type style requirements of Federal Rule of Civil Procedure 32(a)(6). The brief has been prepared in a proportionally spaced typeface using Microsoft Office Word Version 2007 in 14-point Times New Roman.

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